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EXAMINER	
SIVJI, NIZAR N	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/599,802	MUKHERJEE ET AL.	
	Examiner	Art Unit	
	NIZAR SIVJI	4172	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 October 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/08/2008*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Status of the Claim

1. Claim 1 – 34 are currently pending in this application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 1 – 5, 7, 8, 11, 14 - 22, 24, 25, 28, 31 – 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Garcia-Luna-Aceves et al. (Garcia) Patent. No. 6788702

As Per Claim 1. Garcia teaches a method comprising:

exchanging scheduling information with at least one compatible communication node in a wireless communication network (i.e., scheduling packets are exchanged among neighboring nodes of a computer network. These scheduling packets include descriptions of a transmitting node's 2-hop neighborhood within the computer network, and nodes are able to determine transmission schedules from information received via said scheduling packets Col 6 L 49 - 54);

determining a communication schedule for communications with

the at least one compatible communication node based on the scheduling information (i.e., the computer network is a synchronized network in which time is divided into a number of frames, each of which are made up of a plurality of slots. In such cases, the exchange of scheduling packets should occur within a first number of the slots of each frame, preferably in a common communication channel. Transmission schedules may be determined, at least in part, because nodes advertise their availability using the scheduling packets Col 6 L 55 -62); and

communicating with the at least one compatible communication node based on the communication schedule, wherein communication nodes in the wireless communication network independently determine communication schedules with other compatible communication nodes (i.e., allow for scheduling transmission times and/or channels at a node of a computer network according to previously reserved and requested transmission schedules received in packets transmitted by neighboring nodes of the computer network. Such packets are transmitted at the beginning of each frame period within the computer network and transmission times and/or channels are schedules for periods indicated as being available according to information included in the packets. In one implementation of this scheme, previously reserved transmission schedules have precedence over the requested transmission schedules and conflicts between requested transmission schedules are resolved according to a priority scheme Col 7 L 7 -

20).

As Per Claim 2. Garcia teaches the method of claim 1 as discussed above wherein communications with each of the at least one compatible communication node are established over at least one corresponding communication link, which does not contend with other communication links in the wireless communication network during scheduled communications (i.e., avoids collisions by assuming nodes are synchronized with their neighbors, have knowledge of their neighbors' schedules, and are able to receive from multiple transmitting neighbors simultaneously. This final assumption requires fairly sophisticated radio hardware Col 5 L 44 – 49).

As Per Claim 3. Garcia teaches the method of claim 1 as discussed above wherein communications with the at least one compatible communication node are established over a plurality of communication links, which do not contend with each other or with other communication links in the wireless communication network during scheduled communications (i.e., avoids collisions by assuming nodes are synchronized with their neighbors, have knowledge of their neighbors' schedules, and are able to receive from multiple transmitting neighbors simultaneously. This final assumption requires fairly sophisticated radio hardware Col 5 L 44 – 49).

As Per Claim 4. Garcia teaches the method of claim 1 as discussed above wherein the at least one compatible communication node is a plurality of compatible communication nodes and at least one communication schedule is

established for controlling communications with each of the plurality of compatible communication nodes (i.e., scheduling packets are exchanged among neighboring nodes of a computer network. These scheduling packets include descriptions of a transmitting node's 2-hop neighborhood within the computer network, and nodes are able to determine transmission schedules from information received via said scheduling packets. 6 L 49 – 54).

As Per Claim 5. Garcia teaches the method of claim 4 as discussed above wherein scheduling embodied in the at least one communication schedule for each of the plurality of compatible communication nodes within the at least one communication schedule is provided in serial fashion (i.e., communication session between nodes of the network should occupy contiguous time periods over a designated channel. Requested communication sessions are added to the working schedule after verifying that the requested sessions can be accommodated using the feasible schedule. Col 8 L 18 - 23).

As Per Claim 7. . Garcia teaches the method of claim 1 as discussed above wherein the communication schedule provides a schedule for exchanging scheduling information with the at least one compatible communication node (i.e., allow for scheduling transmission times and/or channels at a node of a computer network according to previously reserved and requested transmission schedules received in packets transmitted by neighboring nodes of the computer network. Such packets are transmitted at the beginning of each frame period within the computer network and transmission times and/or channels are

schedules for periods indicated as being available according to information included in the packets. In one implementation of this scheme, previously reserved transmission schedules have precedence over the requested transmission schedules and conflicts between requested transmission schedules are resolved according to a priority scheme Col 7 L 7 - 20).

As Per Claim 8. Garcia teaches the method of claim 1 as discussed above wherein the communication schedule provides a schedule for forwarding traffic to or from the at least one compatible communication node and for exchanging scheduling information with the at least one compatible communication node (i.e., scheduling packets are exchanged among neighboring nodes of a computer network. These scheduling packets include descriptions of a transmitting node's 2-hop neighborhood within the computer network, and nodes are able to determine transmission schedules from information received via said scheduling packets. 6 L 49 – 54).

As Per Claim 11. Garcia teaches the method of claim 1 as discussed above wherein the communication schedule defines transmission opportunities during which communications with the at least one compatible communication node are scheduled to take place (i.e., scheduling packets are exchanged among neighboring nodes of a computer network. These scheduling packets include descriptions of a transmitting node's 2-hop neighborhood within the computer network, and nodes are able to determine transmission schedules from information received via said scheduling packets Col 6 L 49 - 54)

As Per Claim 14. Garcia teaches the method of claim 11 as discussed above wherein certain packets are scheduled to hop through a plurality of compatible communication nodes during a given transmission opportunity (i.e., channel access used in multihop wireless networks consists of establishing transmission schedules, i.e., allocating stations to different times and data channels (e.g., frequencies, spreading codes, or their combination) in a way that no collisions occur. Transmission scheduling can be static or dynamic; MAC protocols based on dynamic transmission scheduling explore the spatial reuse of the radio channel and thus have much higher channel utilization than such fixed scheduling approaches as TDMA and FDMA Col 4 L 58 – 67).

As Per Claim 15. Garcia teaches the method of claim 11 as discussed above wherein communications with a plurality of compatible communication nodes are scheduled to occur during a given transmission opportunity (i.e., the identification of reserved communication times and/or channels should be made after eliminating any conflicting scheduled transmissions for those communication times and/or channels.Col 7 L 3 – 6).

As Per Claim 16. Garcia teaches the method of claim 1 as discussed above wherein the scheduling information comprises communication parameter information, and the communication schedule is determined, in part, based on the communication parameter information (i.e., transmit/receive schedule at a node of a computer network by first monitoring a common communication channel within the computer network to determine from information included

within packets transmitted within the common communication channel previously scheduled transmission times and/or channels and advertised listening times of neighboring nodes in the computer network. The information included within the packets should include a list of the neighboring nodes' scheduled outbound communications, a list of the neighboring nodes' scheduled inbound communications and a list of the neighboring nodes' idle communication periods. Col 7 L 29 – 42).

As Per Claim 17. Garcia teaches the method of claim 1 as discussed above wherein the scheduling information comprises at least one of collision information pertaining to past transmission

opportunities and susceptibility information pertaining to future

available transmission opportunities that may likely be subjected to

interference (i.e., A deterministic scheduling algorithm in NETS allows each node to determine collision-free transmission schedules for itself and its 2-hop neighbors based on the information the node receives in NETS packets from its neighbors. This algorithm permits nodes to avoid choosing the same times and data channels for their schedule reservations. Nodes can send information to one another over those times and data channels where they advertise to be listening while not active in scheduled links Col 9 L 47 - 55).

As Per Claim 18. Garcia teaches a communication node comprising:

at least one wireless communication interface (i.e., scheduling packets are

exchanged among neighboring nodes of a computer network Col 6 L 49 - 51); and

a control system associated with the at least one wireless communication interface and adapted to (i.e., scheduling packets include descriptions of a transmitting node's 2-hop neighborhood within the computer network, and nodes are able to determine transmission schedules from information received via said scheduling packets Col 6 L 50 - 54):

exchange scheduling information with at least one compatible communication node in a wireless communication network (i.e., the exchange of scheduling packets should occur within a first number of the slots of each frame, preferably in a common communication channel Col 6 L 58 - 60);

determine a communication schedule for communications with the at least one compatible communication node based on the scheduling information (i.e., the exchange of scheduling packets should occur within a first number of the slots of each frame, preferably in a common communication channel Col 6 L 60 - 62); and

communicate with the at least one compatible communication node based on the communication schedule (i.e., the requested communication times and/or channels should correspond to available times and/or channels advertised by one or more nodes of the computer network Col 6 L 67 – Col 7 L 3),

wherein communication nodes in the wireless communication network independently determine communication schedules with other compatible

communication nodes (i.e., allow for scheduling transmission times and/or channels at a node of a computer network according to previously reserved and requested transmission schedules received in packets transmitted by neighboring nodes of the computer network. Such packets are transmitted at the beginning of each frame period within the computer network and transmission times and/or channels are schedules for periods indicated as being available according to information included in the packets. In one implementation of this scheme, previously reserved transmission schedules have precedence over the requested transmission schedules and conflicts between requested transmission schedules are resolved according to a priority scheme Col 7 L 7 - 20).

As Per Claim 19. Garcia teaches a communication node of claim 18 as discussed above wherein communications with each of the at least one compatible communication node are established over at least one corresponding communication link, which does not contend with other communication links in the wireless communication network during scheduled communications (i.e., avoids collisions by assuming nodes are synchronized with their neighbors, have knowledge of their neighbors' schedules, and are able to receive from multiple transmitting neighbors simultaneously. This final assumption requires fairly sophisticated radio hardware Col 5 L 44 – 49).

As Per Claim 20. Garcia teaches a communication node of claim 18 as discussed above wherein communications with the at least one compatible communication node are established over a plurality of communication links,

which do not contend with each other or with other communication links in the wireless communication network during scheduled communications (i.e., avoids collisions by assuming nodes are synchronized with their neighbors, have knowledge of their neighbors' schedules, and are able to receive from multiple transmitting neighbors simultaneously. This final assumption requires fairly sophisticated radio hardware Col 5 L 44 – 49).

As Per Claim 21. Garcia teaches a communication node of claim 18 as discussed above wherein the at least one compatible communication node is a plurality of compatible 'communication nodes, and at least one communication schedule is established for controlling communications with each of the plurality of compatible communication nodes (i.e., allow for scheduling transmission times and/or channels at a node of a computer network according to previously reserved and requested transmission schedules received in packets transmitted by neighboring nodes of the computer network. Such packets are transmitted at the beginning of each frame period within the computer network and transmission times and/or channels are schedules for periods indicated as being available according to information included in the packets. In one implementation of this scheme, previously reserved transmission schedules have precedence over the requested transmission schedules and conflicts between requested transmission schedules are resolved according to a priority scheme Col 7 L 7 - 20).

As Per Claim 22. Garcia teaches a communication node of claim 21 as discussed above wherein scheduling embodied in the at least one communication schedule for each of the plurality of compatible communication nodes within the at least one communication schedule is provided in serial fashion (i.e., communication session between nodes of the network should occupy contiguous time periods over a designated channel. Requested communication sessions are added to the working schedule after verifying that the requested sessions can be accommodated using the feasible schedule. Col 8 L 18 - 23).

As Per Claim 24. Garcia teaches a communication node of claim 18 as discussed above wherein the communication schedule provides a schedule for exchanging scheduling information with the at least one compatible communication node (i.e., allow for scheduling transmission times and/or channels at a node of a computer network according to previously reserved and requested transmission schedules received in packets transmitted by neighboring nodes of the computer network. Such packets are transmitted at the beginning of each frame period within the computer network and transmission times and/or channels are schedules for periods indicated as being available according to information included in the packets. In one implementation of this scheme, previously reserved transmission schedules have precedence over the requested transmission schedules and conflicts between requested transmission schedules are resolved according to a priority scheme Col 7 L 7 - 20).

As Per Claim 25. Garcia teaches a communication node of claim 18 as discussed above wherein the communication schedule provides a schedule for forwarding traffic to or from the at least one compatible communication node and for exchanging scheduling information with the at least one compatible communication node information (i.e., the computer network is a synchronized network in which time is divided into a number of frames, each of which are made up of a plurality of slots. In such cases, the exchange of scheduling packets should occur within a first number of the slots of each frame, preferably in a common communication channel. Transmission schedules may be determined, at least in part, because nodes advertise their availability using the scheduling packets Col 6 L 55 -62);

As Per Claim 28. Garcia teaches a communication node of claim 18 as discussed above wherein the communication schedule defines transmission opportunities during which communications with the at least one compatible communication node are scheduled to take place(i.e., scheduling packets are exchanged among neighboring nodes of a computer network. These scheduling packets include descriptions of a transmitting node's 2-hop neighborhood within the computer network, and nodes are able to determine transmission schedules from information received via said scheduling packets Col 6 L 49 - 54).

As Per Claim 31. Garcia teaches a communication node of claim 28 as discussed above wherein certain packets are scheduled to hop through a plurality of compatible communication nodes during a given transmission

opportunity (i.e., channel access used in multihop wireless networks consists of establishing transmission schedules, i.e., allocating stations to different times and data channels (e.g., frequencies, spreading codes, or their combination) in a way that no collisions occur. Transmission scheduling can be static or dynamic; MAC protocols based on dynamic transmission scheduling explore the spatial reuse of the radio channel and thus have much higher channel utilization than such fixed scheduling approaches as TDMA and FDMA Col 4 L 58 – 67).

As Per Claim 34. Garcia teaches the system of claim 18 as discussed above wherein the scheduling information comprises at least one of collision information pertaining to past transmission opportunities and susceptibility information pertaining to future available transmission opportunities that may likely be subjected to interference (i.e., A deterministic scheduling algorithm in NETS allows each node to determine collision-free transmission schedules for itself and its 2-hop neighbors based on the information the node receives in NETS packets from its neighbors. This algorithm permits nodes to avoid choosing the same times and data channels for their schedule reservations. Nodes can send information to one another over those times and data channels where they advertise to be listening while not active in scheduled links Col 9 L 47 - 55).

As Per Claim 32. Garcia teaches a communication node of claim 28 as discussed above wherein communications with a plurality of compatible communication nodes are scheduled to occur during a given transmission opportunity(i.e., the identification of reserved communication times and/or

channels should be made after eliminating any conflicting scheduled transmissions for those communication times and/or channels.Col 7 L 3 – 6).

As Per Claim 33. Garcia teaches the system of claim 18 as discussed above wherein the scheduling information comprises communication parameter information, and the communication schedule is determined, in part, based on the communication parameter information (i.e., transmit/receive schedule at a node of a computer network by first monitoring a common communication channel within the computer network to determine from information included within packets transmitted within the common communication channel previously scheduled transmission times and/or channels and advertised listening times of neighboring nodes in the computer network. The information included within the packets should include a list of the neighboring nodes' scheduled outbound communications, a list of the neighboring nodes' scheduled inbound communications and a list of the neighboring nodes' idle communication periods. Col 7 L 29 – 42).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claim 6, 9, 10, 12, 13, 23, 26, 27, 29, 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garcia-Luna-Aceves et al. (Garcia) Patent. No. 6788702 and further in view of Yeh Pub. No. 2005/0058151.

As Per Claim 6. Garcia teaches the method of claim 1 as discusses above.

Garcia does not discuss in detail wherein the communication schedule provides a schedule for forwarding traffic to or from the at least one compatible communication node.

However, the preceding limitation is known in the art of communications. Yeh discusses in detail that in the prior scheduling mechanism, a probe can be sent from the source to the destination for a high-priority packet or session to request for data 56 packet slots at intermediate nodes. As soon as the data 56 packet slot is reserved successfully at an intermediate node A (e.g., from t.sub.1 to t.sub.2), the probe can be forwarded to the downstream node B to request for another data 56 packet slot that immediately follows the data 56 packet slot at the upstream node (e.g., from t.sub.2 to t.sub.3). As a result, the effective delay at the downstream node B can be as small as 0 (or a very small value for the

turn-around time etc.). Since a packet slot can be scheduled before the node receives the data 56 packet to be transmitted, we refer to this mechanism as "prior scheduling" (Para 211). Therefore, it is obvious to one having ordinary skill in the art at the time the invention was made that the communication schedule provides a schedule for forwarding traffic to or from the at least one compatible communication node. Thus, the delay is decreased and the throughput will not be degraded.

As Per Claim 9. Garcia teaches the method of claim 1 as discussed above.

Garcia does not discuss in detail wherein the communication nodes in the wireless communication network maintain independent clocks, which are not synchronized with one another.

However, the preceding limitation is known in the art of communications. Yeh discusses in detail that a competitor first decides whether it is preparing to send a prohibiting signal in the following PP-slot. If it does, it selects an appropriate position in the PP-slot either randomly according to an appropriate probability distribution or following certain rules (e.g., according to its priority, urgency, and/or ID). It will then listen to the channel before its time to turn around for transmitting its own prohibiting signal. (As a result, if there is an additional receiver for sensing, the turn-around time can be avoided and considerably increasing the efficiency of MACP/PP.) If it did not hear anything above the appropriate prohibiting threshold, it will transmit a short prohibiting signal at the selected position according to its own clock and viewpoint of the competition

frame; however, if it detects any prohibiting signals before the selected position, it loses the competition and will wait for the next competition round or back off for a longer time. A competitor that survives all the prohibiting slots become a candidate, and will become a winner eligible transmitting a control message (or small data packet) if it does not receive any OTS short signals from valid mutual hidden terminal detectors (Para 446). Therefore, it is obvious to one having ordinary skill in the art at the time the invention was made that the communication nodes in the wireless communication network maintain independent clocks, which are not synchronized with one another. Thus, will optimize the performance.

As Per Claim 10. Garcia teaches the method of claim 1 as discussed above.

Garcia does not discuss in detail that further comprising providing a plurality of queues for traffic to send to the at least one compatible communication node and corresponding to a plurality of quality of service levels, wherein determining the communication schedule provides scheduling sufficient to ensure communications with the at least one compatible communication node occur according to an appropriate quality of service.

However, the preceding limitation is known in the art of communications. Yeh discusses in detail that there are several major differences between enhanced distributed coordination function and hybrid coordination function. In distributed coordination function, there is only one queue for all packets at a

node, while in enhanced distributed coordination function, there are eight separate queues at a node, each for a different traffic category. In such a multiple stream model, the first packet in each queue counts down independently of each other. However, if the counters for more than one queue count down to 0 at the same time, a virtual collision occurs. The queue with the highest priority then has the right to send the data 56 packet or the associated RTS 60 message, while the other queue(s) back offs and repeats the countdown process (Para 23). Yeh further discusses that IEEE 802.11e is currently being standardized to enhance IEEE 802.11 for QOS provisioning. 802.11e is backward compatible with the 802.11 MAC protocol and supports all the current PHY-layer specifications including IEEE 802.11, 11a, 11b, and 11g, but augments the MAC protocol with the enhanced distributed coordination function (EDCF) and the hybrid coordination function (HCF) (Para 21). Therefore, it is obvious to one having ordinary skill in the art at the time the invention was made that plurality of queues for traffic to send to the at least one compatible communication node and corresponding to a plurality of quality of service levels, wherein determining the communication schedule provides scheduling sufficient to ensure communications with the at least one compatible communication node occur according to an appropriate quality of service. Thus, reducing the delay and increasing the transmission rate of the traffic category.

As Per Claim 12. Garcia teaches the method of claim 11 as discussed above.

Garcia does not discuss in detail wherein the transmission opportunities are variable in length.

However, the preceding limitation is known in the art of communications. Yeh discusses that the group activation message may be initiated by nodes other than the first transmitter A, while node A may schedule for a coordinated time (t.sub.1, t.sub.2) (or a subset of it, a superset of it, or simply an overlapping period of time, depending on the policy) after receiving such a group activation message. The information and instruction in a group activation message may also be combined into an RTS or CTS message, especially when RTS and/or CTS messages are allowed to have flexible length (Para 175). Therefore, it is obvious to one having ordinary skill in the art at the time the invention was made that the transmission opportunities are variable in length. Thus, allowing the packet to be transmitted and or receive concurrently without collisions with reasonably high probability.

As Per Claim 13. Garcia and Yeh teaches the method of claim 12 as discussed above. Yeh further teaches that wherein the lengths of the transmission opportunities are based on communication or scheduling related parameters (i.e., a node may also transmit the group activation message after it successfully scheduled for a transmission reception Para 174).

As Per Claim 23. Garcia teaches the communication node of claim 18 as discussed above.

Garcia does not discuss in detail wherein the communication schedule provides a schedule for forwarding traffic to or from the at least one compatible communication node.

However, the preceding limitation is known in the art of communications. Yeh discusses in detail that in the prior scheduling mechanism, a probe can be sent from the source to the destination for a high-priority packet or session to request for data 56 packet slots at intermediate nodes. As soon as the data 56 packet slot is reserved successfully at an intermediate node A (e.g., from t.sub.1 to t.sub.2), the probe can be forwarded to the downstream node B to request for another data 56 packet slot that immediately follows the data 56 packet slot at the upstream node (e.g., from t.sub.2 to t.sub.3). As a result, the effective delay at the downstream node B can be as small as 0 (or a very small value for the turn-around time etc.). Since a packet slot can be scheduled before the node receives the data 56 packet to be transmitted, we refer to this mechanism as "prior scheduling" (Para 211). Therefore, it is obvious to one having ordinary skill in the art at the time the invention was made that the communication schedule provides a schedule for forwarding traffic to or from the at least one compatible communication node. Thus, the delay is decreased and the throughput will not be degraded.

As Per Claim 26. Garcia teaches the communication node of claim 18 as discussed above.

Garcia does not discuss in detail wherein the communication nodes in the wireless communication network maintain independent clocks, which are not synchronized with one another.

However, the preceding limitation is known in the art of communications. Yeh discusses in detail that a competitor first decides whether it is preparing to send a prohibiting signal in the following PP-slot. If it does, it selects an appropriate position in the PP-slot either randomly according to an appropriate probability distribution or following certain rules (e.g., according to its priority, urgency, and/or ID). It will then listen to the channel before its time to turn around for transmitting its own prohibiting signal. (As a result, if there is an additional receiver for sensing, the turn-around time can be avoided and considerably increasing the efficiency of MACP/PP.) If it did not hear anything above the appropriate prohibiting threshold, it will transmit a short prohibiting signal at the selected position according to its own clock and viewpoint of the competition frame; however, if it detects any prohibiting signals before the selected position, it loses the competition and will wait for the next competition round or back off for a longer time. A competitor that survives all the prohibiting slots become a candidate, and will become a winner eligible transmitting a control message (or small data packet) if it does not receive any OTS short signals from valid mutual hidden terminal detectors (Para 446). Therefore, it is obvious to one having ordinary skill in the art at the time the invention was made that the communication nodes in the wireless communication network maintain

independent clocks, which are not synchronized with one another. Thus, will optimize the performance.

As Per Claim 27. Garcia teaches the communication node of claim 18 as discussed above.

Garcia does not discuss in detail that further comprising providing a plurality of queues for traffic to send to the at least one compatible communication node and corresponding to a plurality of quality of service levels, wherein determining the communication schedule provides scheduling sufficient to ensure communications with the at least one compatible communication node occur according to an appropriate quality of service.

However, the preceding limitation is known in the art of communications. Yeh discusses in detail that there are several major differences between enhanced distributed coordination function and hybrid coordination function. In distributed coordination function, there is only one queue for all packets at a node, while in enhanced distributed coordination function, there are eight separate queues at a node, each for a different traffic category. In such a multiple stream model, the first packet in each queue counts down independently of each other. However, if the counters for more than one queue count down to 0 at the same time, a virtual collision occurs. The queue with the highest priority then has the right to send the data 56 packet or the associated RTS 60 message, while the other queue(s) backoffs and repeats the countdown process (Para 23). Yeh further discusses that IEEE 802.11e is currently being standardized to enhance

IEEE 802.11 for QOS provisioning. 802.11e is backward compatible with the 802.11 MAC protocol and supports all the current PHY-layer specifications including IEEE 802.11, 11a, 11b, and 11g, but augments the MAC protocol with the enhanced distributed coordination function (EDCF) and the hybrid coordination function (HCF) (Para 21). Therefore, it is obvious to one having ordinary skill in the art at the time the invention was made that plurality of queues for traffic to send to the at least one compatible communication node and corresponding to a plurality of quality of service levels, wherein determining the communication schedule provides scheduling sufficient to ensure communications with the at least one compatible communication node occur according to an appropriate quality of service. Thus, reducing the delay and increasing the transmission rate of the traffic category.

As Per Claim 29. Garcia teaches the system of claim 28 as discussed above.

Garcia does not discuss in detail wherein the transmission opportunities are variable in length.

However, the preceding limitation is known in the art of communications. Yeh discusses that the group activation message may be initiated by nodes other than the first transmitter A, while node A may schedule for a coordinated time (t.sub.1, t.sub.2) (or a subset of it, a superset of it, or simply an overlapping period of time, depending on the policy) after receiving such a group activation message. The information and instruction in a group activation message may also be combined into an RTS or CTS message, especially when RTS and/or

CTS messages are allowed to have flexible length (Para 175). Therefore, it is obvious to one having ordinary skill in the art at the time the invention was made that the transmission opportunities are variable in length. Thus, allowing the packet to be transmitted and or receive concurrently without collisions with reasonably high probability.

As Per Claim 30. Garcia and Yeh teaches the system of claim 29 as discuss above. Yeh further discusses that wherein the lengths of the transmission opportunities are based on communication or scheduling related parameters (i.e., a node may also transmit the group activation message after it successfully scheduled for a transmission reception Para 174).

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NIZAR SIVJI whose telephone number is (571)270-7462. The examiner can normally be reached on Mon - Fri 8:00AM - 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis West can be reached on 5712727859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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